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ABSTRACT

Evaluation results of a program (Infant School Program at New York University Medical Center) serving 40 multihandicapped preschool children over a 3-year period are given. Originally presented with accompanying slides, the paper lists goals of early childhood education and describes methods of data collection and program procedures. Ss were evaluated at admission and prior to discharge in the following areas: interaction with materials, awareness of the environment, social responsiveness, communication, affect, gross motor, and fine motor. It was concluded that analysis of the data on the entire group was not meaningful, but that various subgroups, based on levels of functioning, did exist which reflected various patterns of change; and that data (particular teacher observational data) on the individual child was the most useful way to plan a specific educational program for each child. (DE)

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Study of Impact of Early Intervention Developmental Program on Multihandicapped Young Children and Their Families

Ronnie Gordon

Paper Presented at the National Association for the Education of Young Children Annual Convention (Chicago, Illinois, November 10-13, 1977)

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I. Introduction

The focus of this presentation is upon the implications of a three-year evaluation of the intensive educational stimulation program for multi-handicapped children from 18 to 36 months at the Institute of Rehabilitation Medicine. The impact of this program upon the parents of these children was also studied. These findings are available for those wo are interested. However, time does not permit us to present them here. Information on how this material can be secured will be available at the close of this session.

Typical of the scope of information which usually reaches the educator is the following excerpt from a medical evaluation of a multi-handicapped child who attended the infant school program:

> "Cathy was medically diagnosed as 'congenital cerebral palsy, spastic diplegia type.' She was 30 months old and had been assessed as functioning at a mental age (MA) of approximately 13 months on sections of the Bayley Scales. Cathy was severely delayed in motor development. Although able to roll independently from stomach to back or from back to stomach, she could not crawl, creep, or pull to standing. There was no evidence of sensory deficit. She exhibited mild to moderate involvement in her upper extremities, using both palmar and pincer grasp. She had some neuromuscular problems, which impinged upon her production of expressive speech

as partially reflected in the evaluation of her language functioning on the level of a 6-month old child. The staff speech pathologist reported receptive functioning at 10 to 12 months."

This is not sufficient information for planning a comprehensive educational program. It leaves many questions unanswered:

What kind of early intervention program should be designed for this child? Of what value will it be? What changes in his or her development can be expected from exposure to such a program? What are the implications of the medical diagnosis, chronological age (CA) or mental age (MA) to the teacher? Does it tell the teacher how or what to teach? On what areas of development shall the teacher concentrate? What types of goals for the child can be projected on the basis of these data?

Our major concerns as we began this study were a series of questions focusing upon the issue of how can a research study be designed so as to incorporate the rigorous needs of the researcher and yet be directly related to an on-going educational program. How should data be gathered on young multi-handicapped children, each with unique needs and each with an individualized program? If the teacher collects the data, informs the researcher of the growth and development of the child, will the researcher be able to quantify the data and analyze it statistically? Will the data thus gathered by the teacher be of greater value in planning an educational program than data generated from a Mental Age score? Can methods of data collection be designed which will be applicable to the study of all very young children?

These are but a few of the issues and questions to which we addressed ourselves in this study. Our approach was to merge educational data and experience with psychological concerns for methodology and statistical rigor.

Prior to outlining the specific implications of this study for the classroom teacher, educational support staff, psychologists and related professionals, we will present a brief description of the setting and the educational philosophy which influenced the design of this research study. The specific procedures used to study these children and the results obtained will next be presented.

II. Setting and Philosophy

The setting for this study was the Infant School Program located within the Children's Division of the Institute of Rehabilitation Medicine, New York University Medical Center. (slides)

This series of slides illustrates this specially modified room within the Pediatric Wing of the Institute. The room is designed to maximize each child's potential.

1. The railing permits this child to walk along the cabinets.
2. The doors which slide to the side permit him to explore new materials independently.
3. The table, designed with cut-out and adjustable legs provides adequate and secure work space.
4. Textures, or a mirror are often placed on floor level to permit exploration for the child unable to walk or to sit comfortably at the table.
5. A partially glass-enclosed bathroom within the classroom is part of the learning environment.
6. At times children use the sink during dramatic play.

The indoor setting is supplemented by a custom-designed therapeutic playground (slides).

These slides illustrate the variety of experiences which are offered in the playground -- sand, water, climbing, exploration of new experiences and sometimes just a place to relax and socialize. The design of both the playground and the classroom, based upon the experience this department has had since 1962 in working with multi-handicapped children from the ages of three to six, is seen in these slides of our preschool learning lab (slides).

The educational programs at the Institute of Rehabilitation Medicine are based on a developmental-interactive perspective. This educational philosophy, formulated by Barbara Biber, Edna Shapiro and Elizabeth Gelkison of Bank Street College of Education, describes eight basic goals for early childhood education:

1. To serve the child's need to make an impact on the environment through direct physical contact and maneuver. Learning to use Gross Motor and Fine Motor skills.
2. To promote the potential for ordering experience through cognitive strategies. Learning from work with educational materials.
3. To advance the child's functioning knowledge of his environment; giving children ample opportunity to explore.
4. To support the play mode of incorporating experience. Providing opportunities for the child to become involved in dramatic play.
5. To help the child internalize impulse control; learning social skills and appropriate affective reactions

6. To meet the child's need to cope with conflict intrinsic to this state of development, the teacher must recognize that conflict will occur and must assist the child in understanding the problem.
7. To facilitate the development of an image of self as a unique and competent person.
8. To help the child establish mutually supporting patterns of interactions; communication development in social situations.

As with any program it is the educational staff (the director and teachers) and supportive service staff (therapists) who are the critical interpretors of the educational program. The two teachers in the Infant Program possess in-depth knowledge of child development, competence in assessing the specialized needs of these young multi-handicapped children and an ability to develop and implement individualized curricular goals based on multi-dimensional aspects of development. These teachers played a significant role in formulating the research procedures used in this study.

III. Methods of Data Collection

Through an on-going series of meetings between the research team and the educational staff, a research methodology developed which was a natural outgrowth of the psychoeducational philosophy upon which the program is based. The goals for early childhood education mentioned previously were translated into seven major dimensions through which change in each individual child could be examined. (We will now distribute a summary of this system.) These dimensions, some of which were hierarchically ordered were designed to incorporate a wide range of functioning.

1. Interaction with Materials

   ex: Exploration and use of material can range from a child playing with a crib toy to banging a drum, or the ability to finely discriminate between size, as in nesting.

2. Environmental Awareness

   ex: Exploring what's inside a drain, or feeling with one's feet the difference in textures.

3. Social Responsiveness

   ex: Awareness of another's presence or having a discussion.

4. Communication -- involves both verbal and non-verbal behaviors.

5. Affect -- happy or unhappy

6. Gross Motor Skills

   ex: walking and stacking blocks

7. Fine Motor Skills

   ex: Carefully rotating two cups before inserting them

It was decided that narrative records or logs written by the child's teacher, three mornings per week, would serve as the source of data upon which the child's functioning in the seven psycho-educational dimensions would be examined. The next slide is an excerpt from the log of Sharon, written by her teacher, Mrs. Brenner (copies of this log will be available later). As you can see, this is rich in detail and includes vivid descriptions of Sharon's reactions to the materials, her use of the materials, and her ability to communicate her needs toothers. The next slide illustrates how this record would be coded using the analytic system outlined above.
The application of the coding

system to the qualitative description by Sharon's teacher makes it possible to quantify the behavior of the child and thus make it amenable to statistical analysis. The results of this analysis will next be presented.

IV. Procedures

Forty children enrolled in the program during 1972-1975 were chosen as subject. Each child remained in the program an average of 3 months. They ranged in age from 19-40 months at the time of admission and were comprised of 17 females and 23 males. MA's ranged from 3-29 months and IQ's from 11-93 (slide). Both the socioeconomic status of the families and the ethnic background of the children varied (slide). The majority of the children (70%) were diagnosed as cerebral palsy with the other 30% broadly classified as spina bifida, delayed development and brain damage (slide).

Since medical etiology alone was not directly related to level of functioning in the seven psycho-educational dimensions a score representing the joint clinical judgment of a child's degree of developmental delay was generated. Therapists from each of the disciplines (psychology, physical therapy, speech) assessed the severity of delay (intellectual, motor, language) on the basis of the child's functioning during the first few weeks on program. The educational staff also rated the child in each area of development (motor, language, intellectual, social and affective). The judgments of the therapists and of the educators were compared. When a discrepancy existed a joint decision was reached. For each child, this yielded a delay score in each of five areas as well as a sum delay score. The combination of delay scores and medical diagnosis thus yielded an individualized developmental picture of each child which was useful in planning an educational program.

The primary sources of data were the teacher-written logs which were written on approximately three mornings per week for the duration of a child's stay. These qualitative records were transformed into quantitative data through the application of the coding system to approximately 50 logs on each child. Quantitative summaries of the logs written during the first 2-3 weeks (pre) and last 2-3 weeks (post) of a child's stay on program were then used as the primary documentation of change in each of the seven psychoeducational dimensions.

A secondary source of data was videotaped evaluation sessions of the child during which the teacher presented the child with a series of materials and tasks geared to determine the child's optimal level of functioning with a range of educational tasks.

Specific attention was focused on the child's competence with materials, as measured by the successful completion of tasks. To each indication of competent performance, an age level was assigned. The age level was the age at which one would expect a normal child to complete the task without any problems.

Both the videotape data and the age level analysis were found to be valid and reliable measures yielding information comparable to, and at times, beyond that derived from the log data. Due to the focus of this presentation, however, only the data from the teacher's logs will be discussed.

V. Results

Changes in levels of functioning in each of the psycho-educational dimensions were examined by: (1) noting changes in the total group of 40

children as a whole; (2) noting changes in subgroups (based upon clinically assessed levels of functioning, either high, middle or low) of children; and (3) focusing on changes exhibited by one child.

When pre and post log data for the total groups of children were examined there was evidence of change, although the change was not statistically significant. Although mean scores changed, their distribution or variance (the range of deviation from highest to lowest) also changed; that is, there was an indication that during stay on program the lower levels of functioning were being eliminated. Concurrently, higher levels were emerging. Thus, the range remained fairly stable for the total group although there were shifts in high and low points. These findings conflicted with our clinical judgments that all individual children did indeed exhibit "change" while on program in all or particular areas of development.

Since examination of individual scores revealed different patterns of change, both in terms of time and psychoeducational dimensions, we felt that these individual changes were being missed in our statistical analysis when all the children were grouped together. Clinically we also distinguished between those children who were functioning on a "low" level and those functioning on a "high" level.

The three subgroups -- low middle, high -- were established on the basis of the joint judgments of all the child's therapists and the Project Director's judgment. The range of MA and IQ scores were significantly different for the three subgroups. There were no differences between the three subgroups in the distribution of CA, sex, SES, ethnicity, medical diagnosis, severity of motor dysfunction or type of sensory impairment.

The subgroup data were examined to determine whether these subgroups would be differentiated in terms of differences in patterns of change in the children. If coherent subgroups had been assembled, then the data should be able to differentiate these subgroups and it would be expected that the children in any one subgroup would be judged to be more similar in funtioning to other members of that subgroup than to children in the other subgroups, although within-group variability might still be considerable. We felt that the changes that did indeed occur in the children might be highlighted when similarly functioning children were first grouped together and then examined.

When the data for the subgroups were examined, pre to post differences were evident both in terms of the average level of functioning for each group as well as inter-group variability. The pre-to-post range in each dimension differed with subgroup status. In addition, a differential pattern of significant change emerged when the data for each dimension were examined across subgroups. That is, not only was the general range of level functioning different in each subgroup, but the individual dimensions showed differing degrees of change relative to a particular subgroup.

The low subgroup exhibited significant pre-to-post change in the dimensions of Interaction with Materials, Affect, and Gross Motor Activity. The middle subgroup exhibited significant pre-to-post change in the dimensions of Interaction with Materials, Social Responsiveness, and Communication. In the high subgroup changes were in Social Responsiveness, Communication and Gross Motor.

Pre and post profile of scores in the seven psychoeducational dimensions for each of the subgroups indicated that there was a large degree of "scatter" in performance across dimensions. That is, in any particular subgroup of children there were differential levels of functioning in terms of dimensions. Level of functioning could be high in one dimension and low in another, for example. This kind of finding is congruent with expectations in a diverse population such as ours. Differential pre and post averaged profiles emerged for each of the subgroups. The great variability in functioning within a particular subgroup was also evident when the range of the scores was examined. The subgroups were by no means homogenous, but they were less heterogeneous than the total group of children.

The data were further examined to determine whether the subgroups differed in terms of their recorded functioning in the seven psychoeducational dimensions at admission and/or prior to discharge. The following findings emerged:

1. In the dimension of Interaction with Materials, the scores of the children in the low subgroup were found to be lower and not to overlap with those of children in either the middle or high subgroup. This was true during both the pre and post periods. In contrast, the scores of the children in the middle and high subgroups did exhibit some degree of overlap during both the pre and post periods.
2. In the dimension of Awareness of the Environment the scores of the children in the three subgroups were found to overlap significantly during both pre and post periods.
3. In the dimension of Social Responsiveness, the range of low and high subgroup scores was found to differ significantly both at admission

and prior to discharge. The low and middle subgroups did not differ at admission, but the middle subgroup became distinct from the low prior to discharge. This indicated that, even though their level of functioning was similar upon admission, the children in the middle subgroup made greater gains prior to discharge than the children in the low subgroup. A comparison of the range of scores in the middle and high subgroups yielded a similar finding; although their scores were similar at admission, the high group scored significantly higher just prior to discharge, indicating that the high subgroup made greater gains on program than the middle subgroup.

4. In the dimension of Communication during both pre and post periods, the high subgroup yielded scores significantly higher than those obtained from children in either the low or middle subgroups. During the pre period the low subgroup scores showed a trend toward being lower than those of the middle subgroup, but these two subgroups were not significantly different prior to discharge, indicating that the children in the low subgroup had made gains in this dimension but the middle group remained comparatively static.
5. The scores of the children in the dimension of Affect were found to overlap significantly during both pre and post periods.
6. In the dimension of Gross Motor, the scores of the children in the three subgroups overlapped during both pre and post periods. At admission, the middle subgroup tended to exhibit scores higher than those of the low subgroup. This trend was not evident prior to discharge, indicating that the low subgroup children did make some gains in gross motor functioning while on program, as did the high subgroup.

7. In the dimension of Fine Motor, the low subgroup was found to be distinct in that its range of scores upon admission and prior to discharge was lower than those of either the middle or high subgroups. The children in the middle and high subgroups exhibited some degree of overlap in level of functioning in this dimension, both upon admission and prior to discharge.

Finally, data on the individual child were examined in depth. It was found that profiles on the individual child yielded the most meaningful information for the teacher in planning the program. Therefore, for the very young and handicapped child, functioning should be analyzed on a child-by-child basis and not in terms of subgroups, or "samples" of children.

VI. Implications

Based on this study, what have we learned which directly relates to the teacher and those involved in planning an appropriate program for the young handicapped child?

A. That the observations by the teacher are valuable and necessary when planning the child's program. From this it follows that the teacher must learn to examine the child's actions-in-depth. The teacher must be able to note not only that the child picked up a brush and painted, but that the child picked up the brush appropriately, re-positioned for a better grasp and after wiping off the excess paint, made a deliberate vertical stroke on the paper. The following excerpt from Cathy's log illustrates this:

"She had difficulty grasping (the 1" cubes). Dropped it on the table and adjusted her grasp. Dropped several cubes into the milk bottle this way after I told her to 'put it in.' I then offered a cube towards her right hand. She grasped it with that hand, showing less difficulty in holding and inserting."

This type of narrative is more informative for the teacher than the excerpt from the medical record which was presented earlier. Cathy is diagnosed as Congenital Cerebral Palsy, spastic diplegia type!

B. That educational assessment and planning for each young handicapped child must reflect the multi-dimensional aspect of his/her development. That is, the teacher cannot plan a program based upon the global knowledge that a given child has been diagnosed as having Cerebral Palsy or that she is similar to a group of children who are considered "low functioning" or that, based on an I.Q. score, the child could be labeled as retarded. It is important to examine each aspect of development separately and note the child's level of functioning in terms of: ability to work with materials; social awareness; type of affective responses; the ability to communicate; and gross and fine motor skills. The teacher's evaluation of Cathy, the child described at the beginning, demonstrates the results of a multi-dimensional assessment.

"Analysis of coded anecdotal records (logs) written during the first 2 weeks Cathy was in the Infant Program, furnished both a quantitative and qualitative description of her functioning on admission.

Her sociability was the prominent feature of her behavior. Twenty-one percent of all behaviors were in this dimension with an almost equal proportion in the domain of affect. Both positive and negative affect were almost always appropriate to the situation.

The initial impressions of the staff were confirmed by examination of the logs. Even in those instances in which motor impairment interfered with performance, Cathy's awareness of the goal of the task was evident; 75% of all interactions with materials were completed successfully. These included the completion of structured tasks such as removing and inserting four of six 1" pegs, inserting clothespins into a milk bottle with a 2" diameter, threading discs onto a spindle, and sorting red and yellow beads into appropriate containers. Not only did Cathy complete these and many other tasks, but she did them with understanding and a persistence which was evident in many situations.

The goals for Cathy while in the Infant Program were developed as an extension of the competencies and deficits or needs reported during the first few weeks. She was able to color sort; thus, establishing the awareness of matching colors became a goal. This was accomplished by sorting pegs and sorting beads of various sizes. It was also clear that Cathy had not, as yet, developed the skill of using two hands

effectively. Bilateral activities such as paper tearing and pulling the tops from containers were included in activities to enable her successfully to complete a broader range of manipulations. All of these involved the development of motor abilities while, at the same time, focused on expanding Cathy's competencies with materials.

Reports by the speech pathologist established the fact that vocalizations of words would be difficult. The goals in the area of expressive language were, therefore, to develop clear and specific gestures to indicate preferences and needs. By the seventh week in the program, this was specified in the goals of that week as follows:

> "To lessen her frustration in expressing demands, we will be attentive to Cathy's first requests and then, if we do not understand, we will say so and ask her to show us. We will also ignore the crying and undifferentiated pointing that she does."

One of the underlying components of the entire program was extending Cathy's gross motor ability to facilitate independent exploration. Activities were planned that involved specific exercises such as pulling up to a kneeling position, kicking legs while in a sitting position, and more general goals related to working on tasks while in a standing position.

Although the teachers involved in this study may have had more time to write detailed descriptive reports than the average teacher, it is the focus of their daily observations and not the final narrative which is important. By using the dimensions which were included in this study, any sound teacher of young handicapped or normal children can observe and mentally note the child's behaviors. These notes can then be transferred either weekly or monthly to the reporting form which we now use in all of our programs. (Distribute sample Monthly Progress Report.)

In conclusion, then, in studying 40 multi-handicapped children from 18-36 months, we found:

1. That analysis of data on the entire group of 40 was not [illegible]ngful -- did not provide distinct patterns; there was too much variation in functioning in the total population.
2. That various subgroups, based on levels of functioning, did exist which reflected various patterns of change in different dimensions for each subgroup.
3. That data on the individual child was the most meaningful way to look at change in young handicapped children, yielded the best "image" of the child, and was the information which was most relevant in designing and planning a specific educational program for each child.

The following materials can be ordered through the Preschool and Infant Developmental Programs at Institute of Rehabilitation Medicine, New York University Medical Center:

Coding Manual: Analysis of Behavior of Young Children *

Brochure: Infant Project, IRM *

Reprints:

- Performance of Neurologically Impaired Preschool Children with Educational Materials *
- Special Needs of Multi-Handicapped Children Under Six and Their Families: One Opinion *

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* No Charge

The following materials can be ordered through the Publications Office of the Institute of Rehabilitation Medicine:

	Cost
Monograph #47: The Design of a Preschool Therapeutic Playground: An Outdoor Learning Laboratory	$4.50
Monograph #39: The Design of a Preschool "Learning Laboratory" in a Rehabilitation Center	$3.00
Final Report: Evaluation of Behavioral Change Part I: Study of Multi-Handicapped Young Children	*
Part II: Interaction Between Programs and Parents	*

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* In process of bring reprinted; cost not yet determined.